REMARKS

Claims 1-8 and 10-21 were pending in the present application. Claims 1, 10, 11, and 21 have been amended, leaving Claims 1-8 and 10-21 for consideration in the present amendment.

Support for the amendments to Claims 1 and 21 can be found on page 6, lines 20-21, and Figure 1, among others. Claims 10 and 11 have been amended to correct dependency in view of cancelled claim 9. It is believed the amendments made herein may be properly entered at this time, i.e., after final rejection, because the amendments do not require a new search or raise new issues and they reduce issues for appeal.

Reconsideration and allowance of the pending claims is respectfully requested in view of the following remarks and the §1.132 Declaration filed concurrently herewith.

Claim Rejection Under 35 U.S.C. §112

The rejection of Claims 10, 11 under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject mater which applicants regard as its invention has been rendered moot by way of amendment. Applicants respectfully request that the rejection be withdrawn.

Claim Rejection Under 35 U.S.C. §102

Claims 1-3 and 9-22 are rejected under 35 USC 102(b) as allegedly anticipated by US Patent No. 6,242,350 to Tao et al. (hereinafter "Tao"). Applicants respectfully traverse.

As discussed in Applicants' previous response, to anticipate a claim, a reference must disclose each and every element of the claim. *Lewmar Marine v. Varient Inc.*, 3 U.S.P.Q.2d 1766 (Fed. Cir. 1987).

Tao fails to anticipate Claims 1-3 and 9-22 because Tao fails to teach the use of a neutral plasma, i.e., neutral chemistry. Rather, Tao teaches the use of oxidizing plasma as will be explained in greater detail below. The Office Action suggests that because Tao teaches a gas composition that falls within the range provided in the gas compositions disclosed in Applicants'

examples, that Tao anticipates Applicants' process including exposing a substrate to a neutral plasma. In particular, the Examiner has calculated that one of Tao's gas mixtures comprises 2.44% hydrogen in oxygen. It is this ratio that falls within the range of hydrogen concentrations provided in Applicants' specification at pages 13-14 (2.14% hydrogen) and the gas mixture disclosed in Applicants' Table III (3% hydrogen). While the Examiner's calculations are correct, the conclusions resulting from the calculations are incorrect. Rather, the gas composition and flow rates provided by Tao results in an oxidizing plasma, not a neutral plasma as defined by Applicants.

As is known by those skilled in the plasma arts and as is supported by the §1.132 Declaration filed concurrently herewith, the generation of atomic species in a plasma environment from a gas mixture is not simply correlated to the flow ratios of the components of the plasma gas mixture. The final ratio of atomic hydrogen and atomic oxygen species is based on many factors, including, but not limited to the following: the presence of other gases such as water vapor, the pressure in the reactor, the applied power, the distance from the generation region to the substrate surface, interactions between species, surface recombination effects, and the like. Thus, a cursory analysis of the gas mixture ratios as made by the Examiner does not provide support that that plasma excitation of the gas mixture will result in a neutral plasma, oxidizing plasma, or reducing plasma. However, if one further analyzes the stoichiometric ratios of the elements that make up the different gas mixtures and considers the data provided in Applicants' specification that define the various plasmas, one can readily conclude that the gas mixtures disclosed by Tao are oxidizing plasmas not neutral plasmas. Before presenting this analysis, it is emphasized that Applicants' claims are directed to processes utilizing neutral plasmas and does not include any claims directed to gas mixtures.

The following table illustrates stoichiometric ratios for various gas mixtures disclosed by Applicants and by Tao. The data presented is merely duplicative of the gas mixtures provided in Applicants' Examples 1-4 and the extreme ranges of the gas mixtures disclosed by Tao. A review of these ratios will show that Tao's gas mixtures are oxidative relative to the ratios Applicants have shown as providing neutral plasmas.

Table 1.

Example No.	Plasma Type	O_2 (sccm)	Forming Gas (sccm)	% H_2 in Forming Gas	Amount of H_2O (sccm)	O/H Ratio	0_2/Forming Gas Ratio	Calculation of % H_2 using gas ratios
1	NEUTRAL	1000	1000	5	0	20.00	1.0	5.00
2	NEUTRAL	1000	1000	3	0	33.33	1.0	3.00
4	NEUTRAL	1000	1000	5	0	20.00	1.0	5.00
3A	REDUCING	1685	1685	3	30	21.10	1.0	3.00
3B	NEUTRAL	1966	1404	3	30	27.47	1.4	2.14
3C	OXIDIZING	2247	1123	3	30	35.52	2.0	1.50
Tao (Ex. No. 2)	OXIDIZING	1800	440	10	0	40.91	4.09	2.44
Tao (Ex. No. 2)	OXIDIZING	2200	360	5	0	122.22	6.11	0.82
Tao (claims)	OXIDIZING	1800	250	10	0	72.00	7.20	1.39

As shown in the above noted table, Applicants' Examples 1, 2, and 4 illustrate various starting O/H ratios in the gas mixture that produced neutral plasma as defined by Applicants, i.e., a plasma having about equal amounts of atomic hydrogen and atomic oxygen. It is important to note that no water vapor was added to the gas mixtures disclosed in these examples. The starting ratios of O/H in the gas mixture illustrate that a ratio of at least less than 33.3: 1 produced a

neutral plasma upon subjecting the gas mixture to an energy source in combination with various other plasma reactor conditions. The O_2/forming gas ratio in these examples was 1.0.

In Applicants' Example 3, there was shown three different types of plasma: reducing (3A), neutral (3B), and oxidizing (3C) plasmas. These plasmas were generated with gas mixtures that included water vapor as one of the gas mixture components. As previously discussed, water vapor can contribute significantly to the overall generation of atomic hydrogen and oxygen species. The starting O/H ratios for the various gas mixtures that produced the reducing, neutral, and oxidizing plasmas were 21.20, 27.47, and 35.52, respectively with an O_2/forming gas ratio of 1.0, 1.4,and 2.0, respectively. As shown, the neutral plasma was produced from a gas mixture having an O/H ratio of 27.47 and an O_2/forming gas ratio of 1.4. A gas mixture including an O/H ratio of 35.52 and an O_2/forming gas ratio of 2.0 produced oxidizing plasma. Again, it should be noted that these plasmas contained water vapor, which contributed to the amount of atomic hydrogen and atomic oxygen species.

In contrast, Tao has significantly higher O/H ratios in the disclosed gas mixtures compared to Applicants' disclosed gas mixtures that resulted in neutral plasmas. Because of this, Tao's plasmas will clearly result in the generation of oxidizing plasma. The O/H ratios disclosed by Tao range from 40.91 to 122.22. Keep in mind that these ratios are for gas mixtures that do not contain H_2O vapor. In contrast to Applicants' O/H ratios (that do not contain water in the gas mixture or for that matter, even those that do contain water), these ratios are significantly higher.

With regard to independent Claim 12, Applicants' further point out that its claimed process is directed to a process for removing polymers and etch residues formed during etch from a wafer having a surface therein comprising a low k dielectric material. As noted in Applicants' specification, the use of neutral plasma is especially advantageous for use with substrates including low k dielectrics. Tao fails to disclose processes for removing polymers and etch residues from substrates including a low k dielectric material.

It should be noted that the various ratios disclosed by Tao would clearly result in oxidizing plasmas since the starting O/H ratio is so much greater as compared to Applicants' ratios. In practice, however, since Applicants' claims are directed to processes utilizing neutral plasmas, it should be noted that those skilled in the art would analyze the amounts of atomic species generated from the gas mixture by residual gas analysis, which includes sampling the environment within the gas chamber. Finally, it should be readily apparent from the above discussion that calculation of %H2 using gas ratios, as indicated in the last column of the Table I, is not a good predictor of oxidizing or neutral plasma.

Accordingly, Tao fails to anticipate the processes employing neutral plasma and as such, the rejection applied to Claims 1-3 and 9-22 should be withdrawn.

It is believed that the foregoing amendments and remarks fully comply with the Office Action and that the claims herein should now be allowable to Applicants. Accordingly, reconsideration and allowance is requested.

If there are any additional charges with respect to this Amendment or otherwise, please charge them to Deposit Account No. 06-1130 maintained by Applicants' Attorneys.

Respectfully submitted,

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